

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 31D-249

DIST. 5 REGION South western

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. _____

LOCATION BRIDGE, HWY 99 WEST OF
COOKSTOWN

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: DOCUMENTS TO BE UNFOLDED

BEFORE MICROFILM

31D map



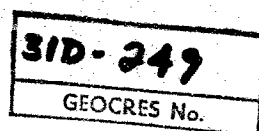
WARNOCK HERSEY SOIL INVESTIGATIONS LTD.

250 MADISON AVENUE, TORONTO 7, ONT. 924-9691

S-64-44

February 26, 1964.

Mr. V.C. Bardawill,
Consulting Engineer,
3255 Yonge Street,
Toronto 12, Ontario.



Re: Soil Investigation
Cookstown, Ontario.

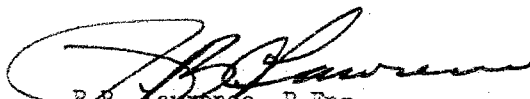
Dear Sir:

We take pleasure in submitting our report on the soil investigation recently carried out at the bridge site near Cookstown, Ontario.

The sub-soils at this site were found to be extremely soft below 12 feet and a pile foundation is required at this site.

We believe this report to be complete, however, should you require further information with regard to content or interpretation, please contact the undersigned.

Yours very truly,
WARNOCK HERSEY SOIL INVESTIGATIONS LTD.


P.B. Lawrence, P.Eng.
Manager.

/sk

COMPLETE FOUNDATION AND SUBGRADE INVESTIGATIONS

SOIL BORINGS AND SAMPLING · LABORATORY AND FIELD TESTING · LOAD BEARING TESTS · PILE LOADING TESTS · ROCK AND CONCRETE CORING · SEISMIC INVESTIGATIONS

INTRODUCTION

We were authorized by Mr. V.G. Bardawill, Consulting Engineer, to carry out a soil investigation at a bridge site two miles south of Cookstown on the 13th Concession.

The purpose of this investigation was to determine:

- (a) the engineering properties of the sub-soil and allowable bearing values.
- (b) the depth of fill.
- (c) ground water conditions.
- (d) the type of foundation best suited for this site.

The work consisted of drilling one hole to approximately 75-feet and one to 115-feet.

PROCEDURE

The locations of the boreholes were laid out by a representative of Mr. Bardawill. Surface elevations of the boreholes were not provided.

The drilling was carried out on February 17th and 18th, 1964. The boreholes were advanced using a 6 inch auger and split spoon samples were obtained from the bottom of the hole. For each split spoon sample, the penetration blows to drive the sampler one foot were recorded.



PROCEDURE
(Cont'd)

The energy of each blow was 4200 inch-pounds obtained by a 140 pound hammer falling a distance of 30 inches. The penetration blows (N value) in sand and finer grained soils provide an empirical means of determining the strength, density and bearing value of the soil.

The standard split spoon samples were returned to our laboratory for classification and interpretation.

Ground water levels were checked by observation on completion of each hole and then by observing the equilibrium water conditions, if any, at subsequent intervals of time. Since no drilling water is used in this procedure, the water level observed is entirely due to the local conditions. See attached borelogs for details of each boring.

When the very soft clay was encountered, a 2-inch 60° Dutch Cone was driven. The cone was driven using a 140 pound hammer falling 30 inches and the number of blows required to drive the cone for each foot was recorded.

SOIL PROFILES

The sub-soils below 12 feet are extremely soft. On the surface in borehole #1 to a depth of 7 feet is a brown, very fine sand which is very loose. The soil then changes to a soft, silty clayey material which becomes extremely soft at 13 feet. In borehole #2, there is a sandy silt down to 7 feet which is probably an old fill.

SOIL PROFILES
(Cont'd)

Between 7 and 8 feet some decayed wood was found. Below 8 feet the soil is a grey silty clay which extends down to 13 feet. At 13 feet the soil changes to the extremely soft clay which was found in borehole #1 at 12 feet. This clay is varved containing some very thin varves of clayey silt. The Dutch Cone was driven below 30 feet. The blows on the cone increase with depth, however, this increase in blows is not due to an increase in soil strength but is caused by the skin friction between the soil and the driving rods. The actual split spoon blows down to 115 feet would probably not exceed 4-5 blows per foot.

The water levels were observed at 14 feet and 12 feet below the ground surface in boreholes # 2 and #1 respectively.

CONCLUSIONS

1. The split spoon and dutch cone blows show the soil to be extremely soft at this site. A spread footing type foundation is not recommended.
2. We recommend a pile type foundation using wooden or steel piles. The pile would develop resistance mostly from skin friction. The length of pile will depend on the loading on the pile and the type of pile used. For estimating the length of pile, a value of about 150 lbs/sq.ft. skin friction may be used for wooden piles and 100 lbs/sq.ft. for steel piles.



CONCLUSIONS
(Cont'd)

3. The piles should be driven to the required dynamic resistance using the Hiley Formula as laid out in the National Building Code.
4. If wooden piles are used they should be treated type and cut off and capped below the ground water table. This will prevent any future deterioration of the pile from wetting and drying.
5. The sides of excavations through the upper stratum of cohesionless sand will require lateral bracing or they should be sloped back at a 45° angle to prevent sliding in.
6. An excess excavated sand from the bridge piers could be used for fill material on the bridge approaches. This sand should be compacted to a minimum of 95% Modified Proctor to prevent any future settlement.

SUMMARY

The sub-soils at this location are extremely soft and of very low bearing capacity. Friction pile type foundation is recommended for this site.

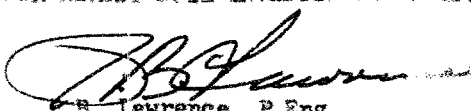
Respectfully submitted,

WARRACK HERSEY SOIL INVESTIGATIONS LTD.

Report by
R. Graves.

/sk




P.B. Lawrence, P.Eng.
Manager.

Warnock Hersey Soil Investigations Ltd



Office Report Of Soil Exploration

Casing Auger Diameter 6" Elevn.
Casing Hammer Wt. Drop
Sample Hammer Wt. Drop

Client Mr. V.G. Bardwell, Order Number S-64-44
Consulting Engineer Borehole Number 1
Location: Bridge Site near Cookstown Date February 17, 1964.

SAMPLE CONDITION & TYPE



Disturbed
Good
Lost

SS - Split Spoon
CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow
- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

GEOCRE No. 510-249

SOIL PROFILE

SHEAR STRENGTH

WATER CONTENT

SAMPLES

| Elevn. Depth | Description | Strata Plot | Depth Elevation Scale Feet | PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration | | Condition | Type | Number | Pen. Resistance | Depth Elevn. Recvry. |
|--------------|--|-------------|----------------------------|--|------------------|-----------|------|--------|-----------------|----------------------|
| | | | | TONS/FT ² | W% ₂₀ | | | | | |
| | Brown, very fine sand, loose, damp, cohesionless. | | 0 | | | | SS | 1 | 20 | 2-3 |
| | | | 5 | | | | SS | 2 | 5 | 5-6 |
| | Grey silt clay, soft, wet, cohesive. | | 7' | | | | SS | 3 | 5 | 7-8 |
| | | | 10 | | | | SS | 4 | 4 | 10-11 |
| | | WT | 12' | | | | SS | 5 | 1 | 12-13 |
| | Grey clay with thin varves of clay silt, very soft, wet, cohesive. | | 13' | | | | TO | 6 | | 15-17 |
| | | | 15 | | | | | | | |
| | | | 20 | | | | SS | 7 | 0 | 20-21 |
| | | | 25 | | | | SS | 8 | 0 | 25-26 |
| | | | 30 | | | | SS | 9 | 0 | 30-31 |
| | | | 31 | | | | | | 0 | 31-32 |
| | | | 32 | | | | | | 0 | 32-33 |
| | | | 33 | | | | | | 0 | 33-34 |
| | | | 34 | | | | | | 0 | 34-35 |
| | | | 35 | | | | | | 1 | 35-36 |
| | | | 36 | | | | | | 2 | 36-37 |
| | | | 37 | | | | | | 3 | 37-38 |
| | | | 38 | | | | | | 3 | 38-39 |
| | | | 39 | | | | | | 4 | 39-40 |
| | | | 40 | | | | | | 4 | 40-41 |
| | | | 41 | | | | | | 4 | 41-42 |
| | | | 42 | | | | | | 5 | 42-43 |
| | | | 43 | | | | | | 5 | 43-44 |
| | | | 44 | | | | | | 5 | 44-45 |
| | | | 45 | | | | | | 7 | 45-46 |
| | | | 46 | | | | | | 7 | 46-47 |
| | | | 47 | | | | | | 8 | 47-48 |
| | | | 48 | | | | | | 8 | 48-49 |
| | | | 49 | | | | | | 8 | 49-50 |

*Bridge deck
Top of runway
El 713.35
See level 701.51
Aug 27 Reels 711.53
See level El 701.43.
V.G. Bardwell*

Warnock Hersey Soil Investigations Ltd



Office Report Of Soil Exploration

Casing Auger Diameter 6" Elevn.
Casing Hammer Wt. Drop
Sample Hammer Wt. Drop

Client Mr. V.G. Bardawill, Order Number S-64-44
Consulting Engineer Borehole Number 1 (cont'd)

LOCATION; Bridge Site near Cookstown. Date February 17, 1964.

SAMPLE CONDITION & TYPE



Disturbed

Good

Lost

SS - Split Spoon

CS - Chunk

DO - Drive Open

DF - Drive Footvalve

TO - Thinwalled Open

WS - Washed Sample

RC - Rock Core

V - Insitu Vane Shear Test

M - Mechanical Analysis

U - Unconfined Compression

Qc - Triaxial Consolidated Quick

Q - Triaxial Quick

S - Triaxial Slow

- Unit Weight

K - Permeability

C - Consolidation

CA - Casing

WL - Water Level in Casing

WT - Water Table in Soil

GEOLOGICAL No.

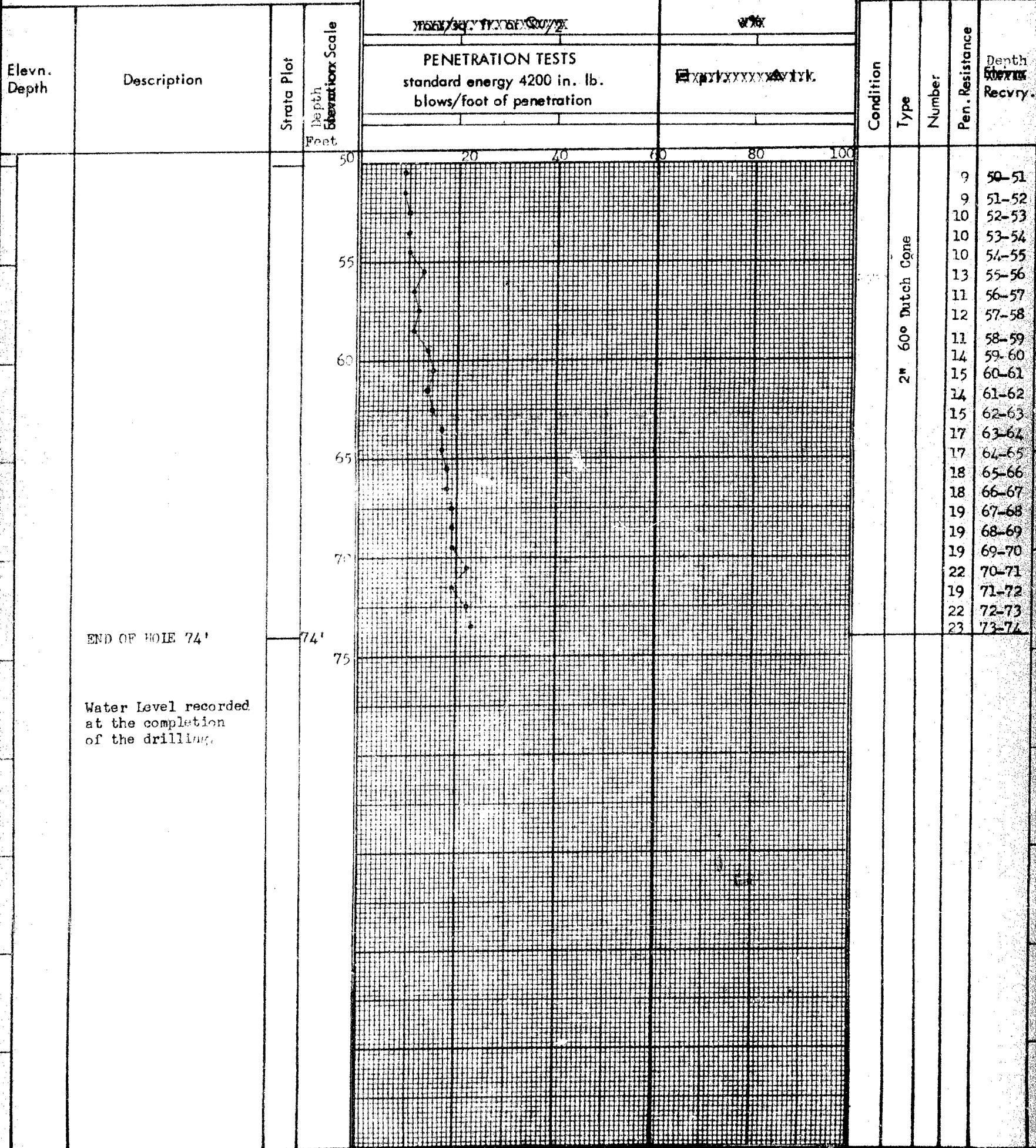
SID-249

SOIL PROFILE

SHEAR STRENGTH

WATER CONTENT

SAMPLES



Warnock Hersey Soil Investigations Ltd



Office Report Of Soil Exploration

Casing Auger
Casing Hammer
Sample Hammer

Diameter 6"
Wt.
Wt.

Elevn.
Drop
Drop

Client Mr. V. J. Burdwell, Order Number S-64-44
Consulting Engineer Borehole Number 2

Date February 18, 1964.

Location: Bridge Site near Cookstown

SAMPLE CONDITION & TYPE



Disturbed
Good
Lost

SS - Split Spoon
CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

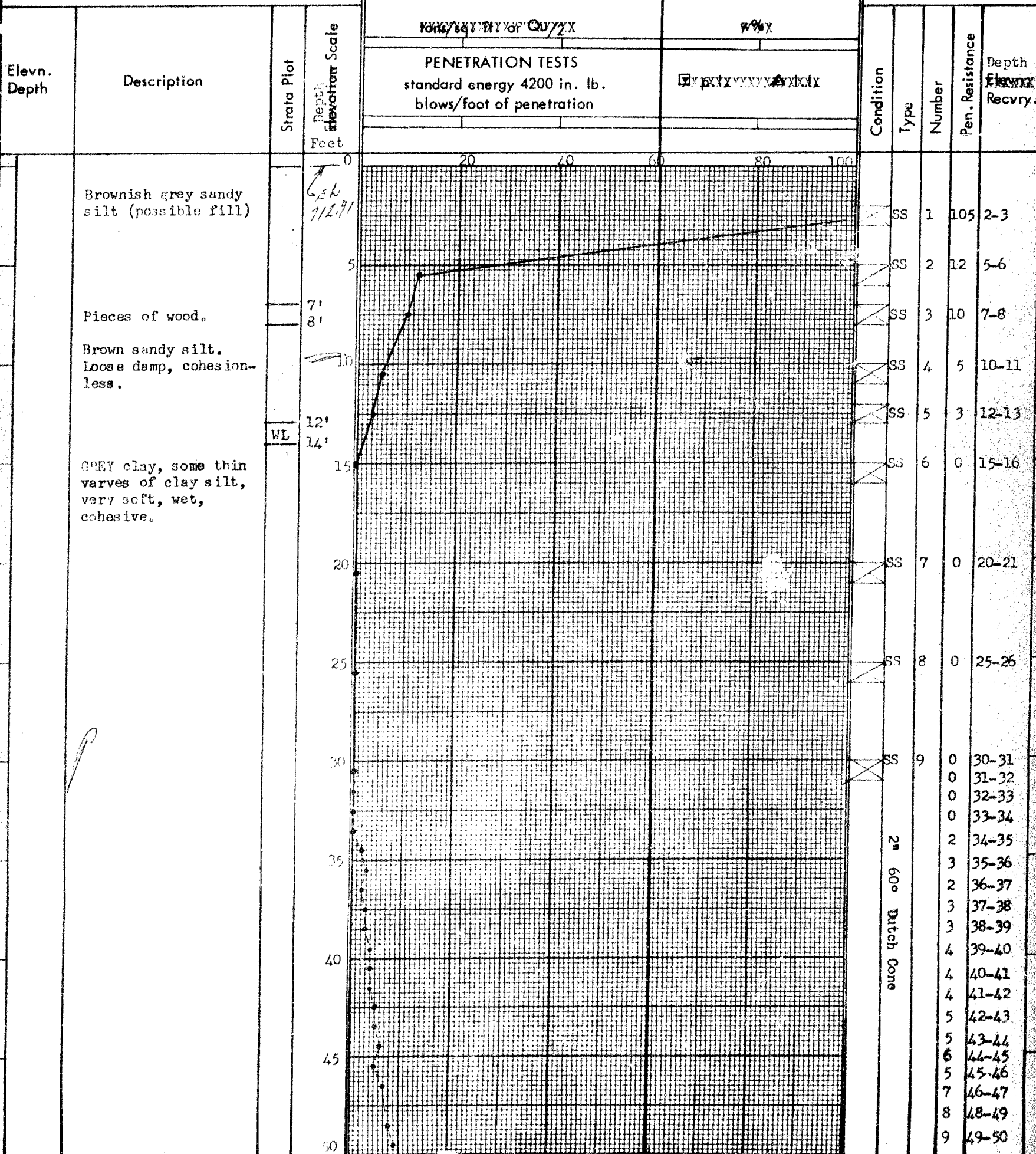
V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow
- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE

SHEAR STRENGTH

WATER CONTENT

SAMPLES



310-249
GEORGES M. B.

Warnock Hersey Soil Investigations Ltd



Office Report Of Soil Exploration

Casing Auger Diameter 6" Elevn.
Casing Hammer Wt. Drop
Sample Hammer Wt. Drop

Client Mr. V.C. Bardavill Order Number S-64-44

Consulting Engineer Borehole Number 2 (Cont'd)²

Location: Bridge Site near Cookstown Date February 18, 1964

SAMPLE CONDITION & TYPE



Disturbed

Good

Lost

SS - Spoon

CS - Chunk

DO - Drive Open

DF - Drive Footvalve

TO - Thinwalled Open

WS - Washed Sample

RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test

M - Mechanical Analysis

U - Unconfined Compression

Qc - Triaxial Consolidated Quick

Q - Triaxial Quick

S - Triaxial Slow

- Unit Weight

K - Permeability

C - Consolidation

CA - Casing

WL - Water Level in Casing

WT - Water Table in Soil

GEOCRS No.

310-249

SOIL PROFILE

SHEAR STRENGTH

WATER CONTENT

SAMPLES

tons/sq. ft. or kN/m²

w%

PENETRATION TESTS

standard energy 4200 in. lb.
blows/foot of penetration

Gr. XXXXX AXXY

Condition

Type

Number

Pen. Resistance

Depth
Recvry.Elevn.
Depth

Description

Strata Plot

Depth
Elevation
Scale
Feet

100

105

110

115

20

40

60

80

100

End of hole 115'

2" 600 Dutch Cone

| | |
|----|---------|
| 40 | 100-101 |
| 39 | 101-102 |
| 40 | 102-103 |
| 40 | 103-104 |
| 40 | 104-105 |
| 42 | 105-106 |
| 39 | 106-107 |
| 42 | 107-108 |
| 42 | 108-109 |
| 40 | 109-110 |
| 55 | 110-111 |
| 54 | 111-112 |
| 50 | 112-113 |
| 51 | 113-114 |
| 54 | 114-115 |